

Systems Engineering: The Glue that Binds Disparate Acquisition Organizations

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Topics

- The Situation
- The Ways Forward
- The Benefits



The Situation

Acquisition Directorate

Mission Systems

- Software Applications
 - Mission
 - Corporate
- Hardware platforms
- Infrastructure
 - Networks
 - Servers
- Some Operations and Sustainment

Enterprise Operations Directorate

Infrastructure

- Networks
- Network Operations
- Servers
- Information Services

Software Applications

- Network Appliances
- Common Applications

Operations and Sustainment



The Situation

- Inefficient and ineffective application of resources in an Information Technology development environment
 - Duplicative work and expenditures
 - Inefficient Capacity Management
 - Overlaps, gaps, disconnects

Lack of Enterprise Solutions



The Situation

- The Problem:
 - Lack of a complete enterprise* view
 - Capabilities and work allocation
 - Requirements definition
- The Solution
 - Establish better business model
 - Establish an approach to take an enterprise view to all changes

* 'Enterprise' is the National System for Geospatial-Intelligence (NSG)



Way Forward #1- Change Business Model

Application Service Provider-
Infrastructure Service
Provider (ASP-ISP)



ASP-ISP Business Model

- Segregates work between service providers
- Drives efficiencies into parent organizations
 - Minimize duplication of functions
 - Efficient application of resources
- The right model to apply
 - Continual technology changes
 - Growth in customer demands
 - Static budgets



ASP-ISP System Elements

ASP

Corporate Apps

Finance
Personnel
Mission Assurance (e.g.,
Personnel, FISMA apps
and tools)
Training
Contract Mgmt
Requirements Mgmt
Program, Project &
Performance Mgmt
Database Mgmt Systems

Mission Apps

Geospatial Knowledge Base
Knowledge Production &
Exploitation
Resource Tasking & Marketplace

Web Based Secure Environment –
Development Interfaces
PO (Portal, SOA, Web server)
Interfaces, integration with
mission apps
Multilevel Security (MLS) Guard
and transfers
Identify Management enablement

Hardware*

Workstations
Servers
Communications
components
Storage components
Phones, PDAs, Video,
Blackberry, etc.
Firmware

*Includes NGA and NSG
hardware

ISP

Enterprise Management Services

Enterprise Service Center
Tier 1 O&S
Enterprise Information Assurance
IAVA, anti-virus, IDS, Firewalls,
Computer Network Defense
Enterprise Information Management
Enterprise Management Tools,
Interface development/ integration,
monitoring and metrics

Common Services

Customer Support tools
Office Automation

Storage Services

Disks, CD, Tapes, etc.
Remote storage
Mgt and monitoring tools
Processing and Storage

Application Hosting Services

Server Hardware & Operating System
E-Mail, Web, Print, Software
Management System
Licensing
Tier 2&3 for HW & Operating System
Directory Services
Domain Name Service
Timing
Authentication/Authorization

Transport Services

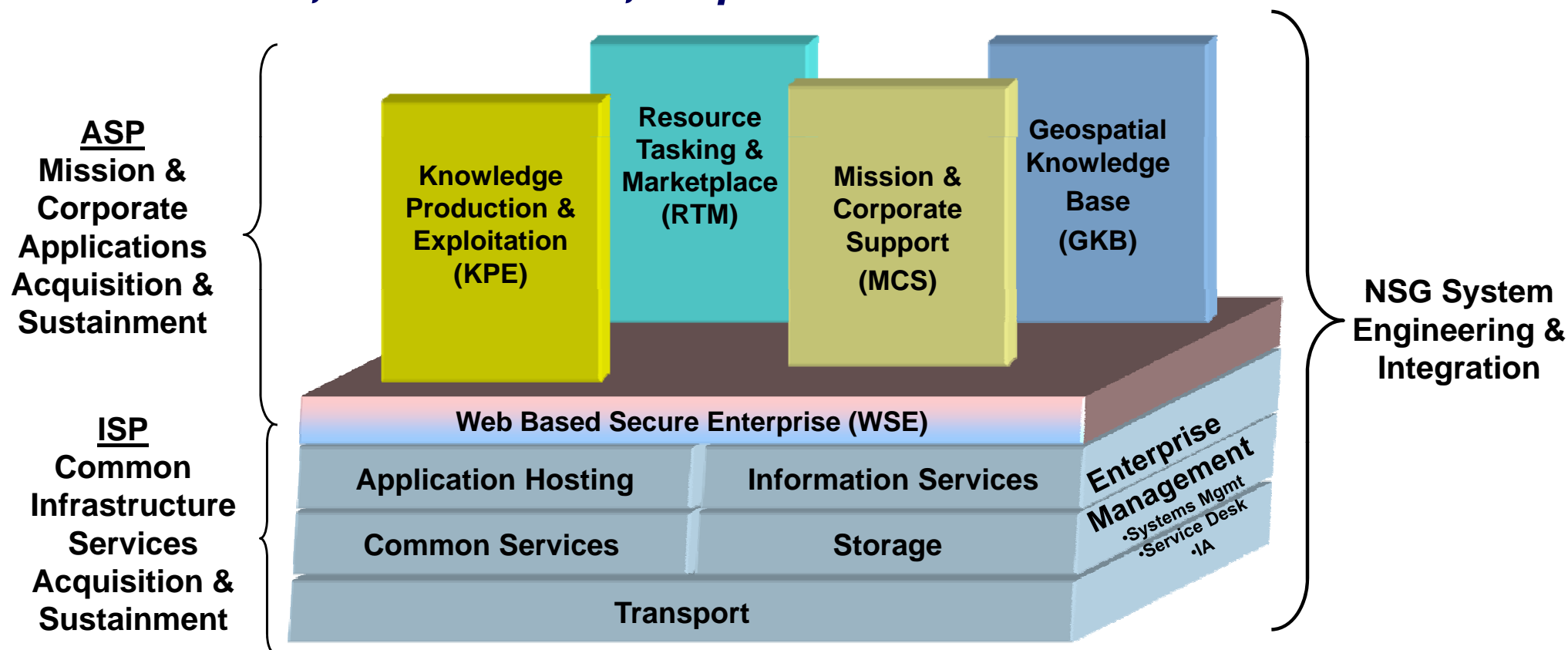
HW – Routers, Hubs, Switches
Circuits

Support Tiers:
Tier 1- Help Desk
Tier 2- On-site technician
Tier 3- Factory



ASP/ISP Model at NGA – Portfolio View

Achieves economies of scale, reduced costs, an agile development environment, and a reliable, responsive IT infrastructure



Economies of Scale Through: Consolidated, Virtual Computing
Shared, Virtual Storage
Enterprise Support Services

Maximizes available resources



ASP-ISP Responsibilities

ASP

“Cradle-to-Grave” responsibility for Corporate/Mission Apps

- ASP Element Engineering
 - Planning
 - Requirements
 - Application Architecture
 - Application Design
- Software acquisition
- Software programming
- Software integration testing
- Software maintenance
- Tier 2 & 3 support for mission and corporate applications
- ASP application license management

Support Tiers:
Tier 1- Help Desk
Tier 2- On-site technician
Tier 3- Factory

ISP

“Cradle-to-Grave” responsibility for IT infrastructure/Common Apps

- ISP Element Engineering
 - Planning
 - Requirements
 - Infrastructure Architecture
 - Infrastructure Design
- Security infrastructure
- IT hardware and supporting software acquisition
- O&S of hardware/designated software
- Systems administration for common applications/operating systems
- Tier 2 & 3 support for IT infrastructure, common applications
- License management servers
- ISP infrastructure software license mgmt

ASP - ISP

- Requirements Analysis & System (Physical) Architecture (NSG Allocated reqts baseline)
- Project Planning
- System Monitoring/Modeling
- Studies
- Request for Change Costing Guidance
- Joint engineering and management reviews
- IT Infrastructure upgrade timing consistent with ASP Needs
- H/W – S/W Integration IC&T
- S/W Deployment
- Program Planning and programming
- System Sustainment (Tier 2)
- Verification & Validation
- Acquisition Planning
- Contract Strategy
- External Interfaces (ODNI, CIO, USD(I))
- Functional Management Interfaces
- NSG PM & DPM Interface

NSET Responsibility ■

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Value Proposition

- Eliminate stovepipe systems and infrastructure
- Maximize use of all organizations' available resources
- Achieve economies of scale
 - Consolidated virtualized services
 - Truly common architecture





The Blinding Obvious

- Both providers perform SE
- Both providers must ensure their elements interface and interoperate
- Both providers need to reduce the complexity and cost of their elements

Systems Engineering is the
common denominator to achieve
the value proposition



Way Forward #2- Enterprise Systems Engineering

(aka System of Systems Engineering)

- Central SE team to bind ASP & ISP activities
 - Perform lifecycle Enterprise-level SE for the NSG Program Manager
 - Synchronize technical and management activities
 - Assure systems and infrastructure integrate and interoperate

**NSG Systems Engineering Team
(NSET)**



NSET

- Key enabler to achieve value proposition
- Integrated team of ASP & ISP systems engineers
- Concurrent Engineering
 - Application developers
 - Infrastructure engineers
 - Operations and Sustainment planners
 - Specialty engineers





NSET

- Evaluate, sponsor and monitor concept studies
- Evaluate strategic and technical requirements
 - Architecture impacts and direction
 - Technical feasibility
 - Impacts to existing infrastructure
 - Alternative design approaches
 - Rough-order-magnitude cost, schedule and risks

Think Enterprise



NSET Composition

- Co-lead by ASP & ISP senior SEs
- Matrixed ASP & ISP engineers
- Reachback support to home SE offices
- Physical co-location is essential





NSET Core Skill Sets

- NSET Management
- Enterprise requirements management
- Systems' architecture development
- Enterprise modeling and analysis
- Interface control
- SE monitoring of implementation activities



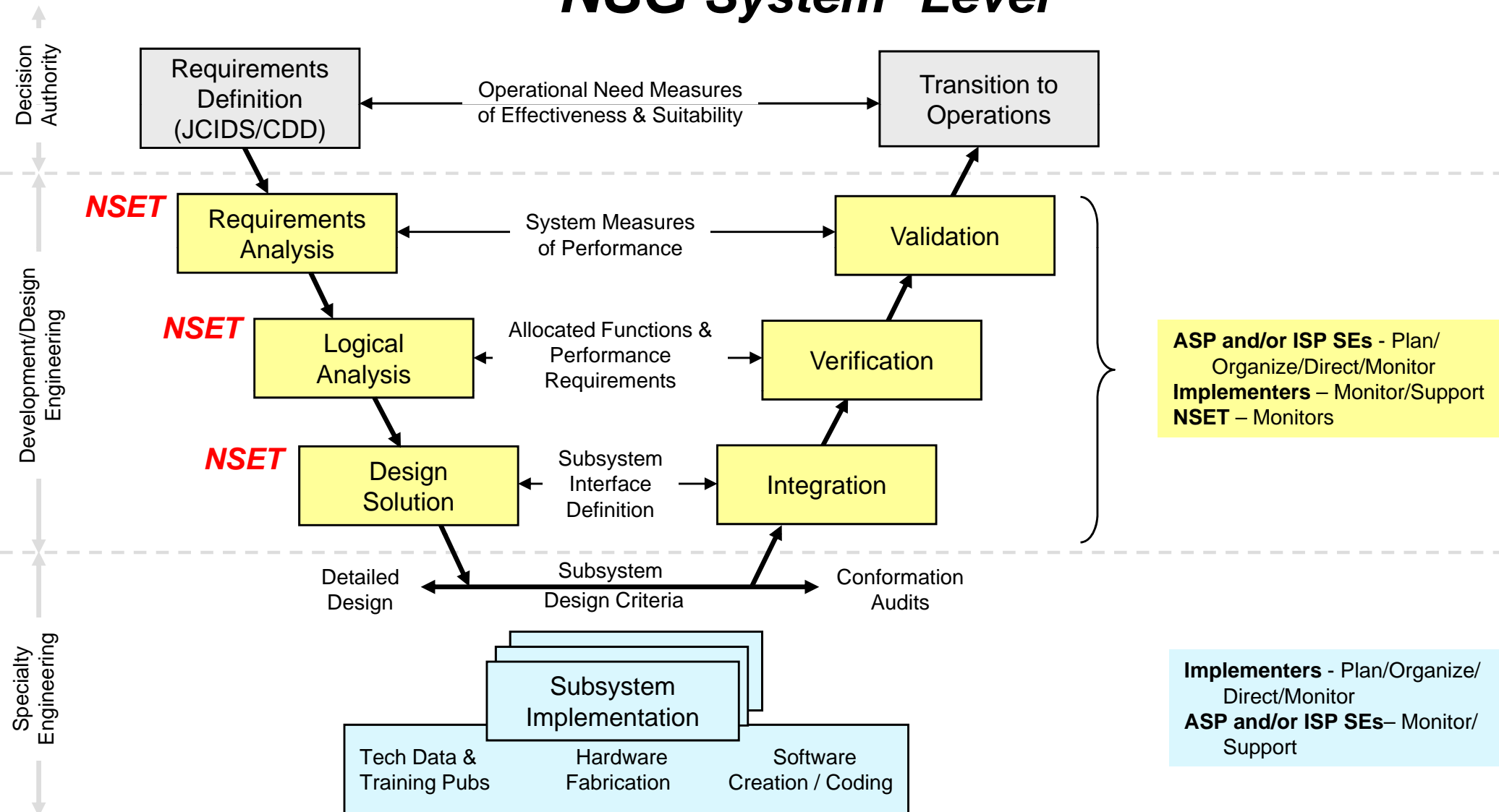
NSET

- Applies most applicable best SE practices
 - Eisner Systems Engineering Model
 - DoD Systems of Systems Engineering Guide
 - DoD Desktop Acquisition Guide
 - INCOSE SE Handbook
 - FAA Integrated Capability Maturity Model
- Ensures key processes are used by service providers
 - Requirements Management
 - Configuration Management
 - Risk Management
 - Readiness
 - Test and Evaluation



Systems Engineering “V” model

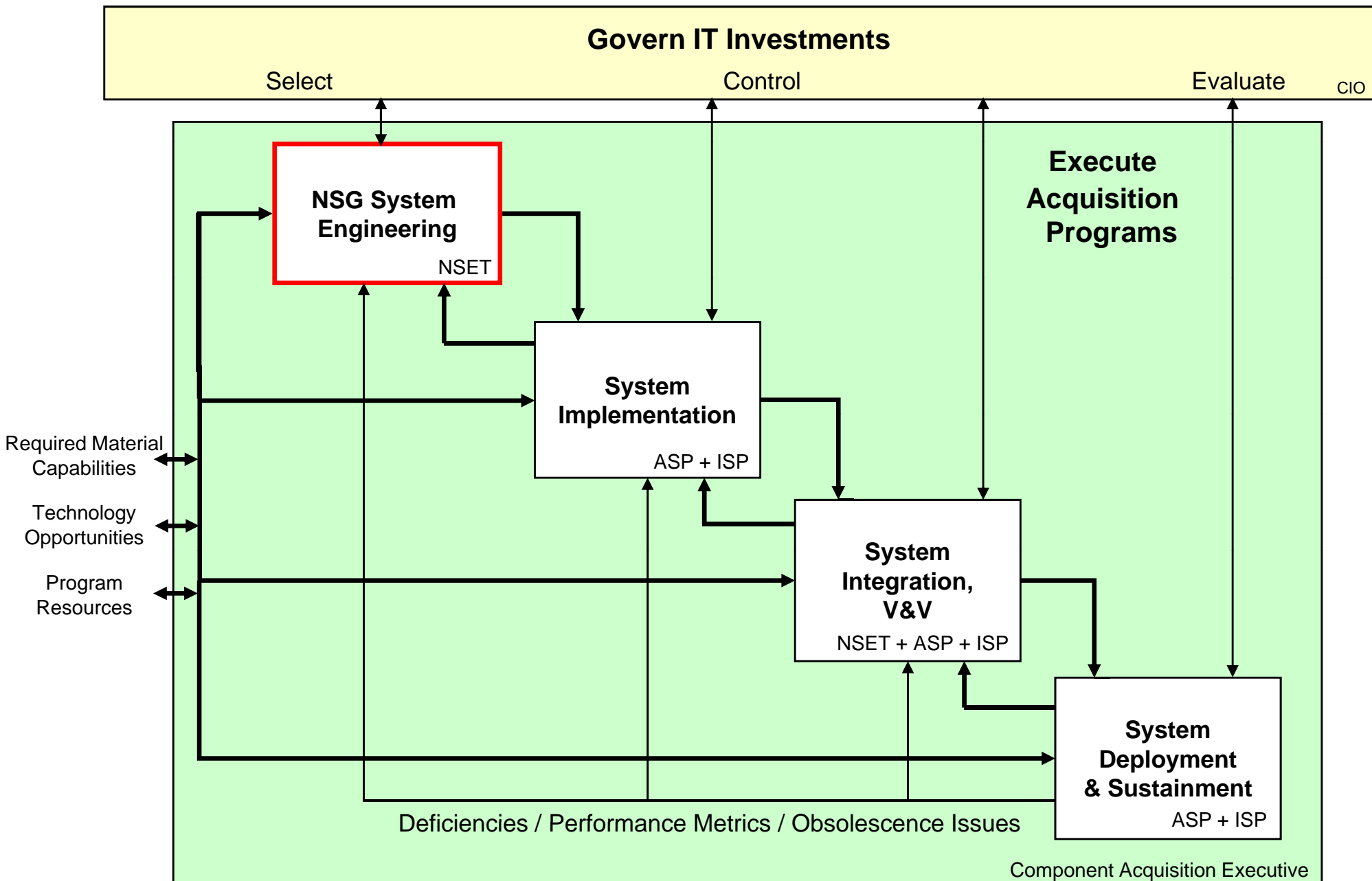
NSG System* Level



* In the context of this chart, the “system” is the NSG, and “subsystems” are NSG segments or products.

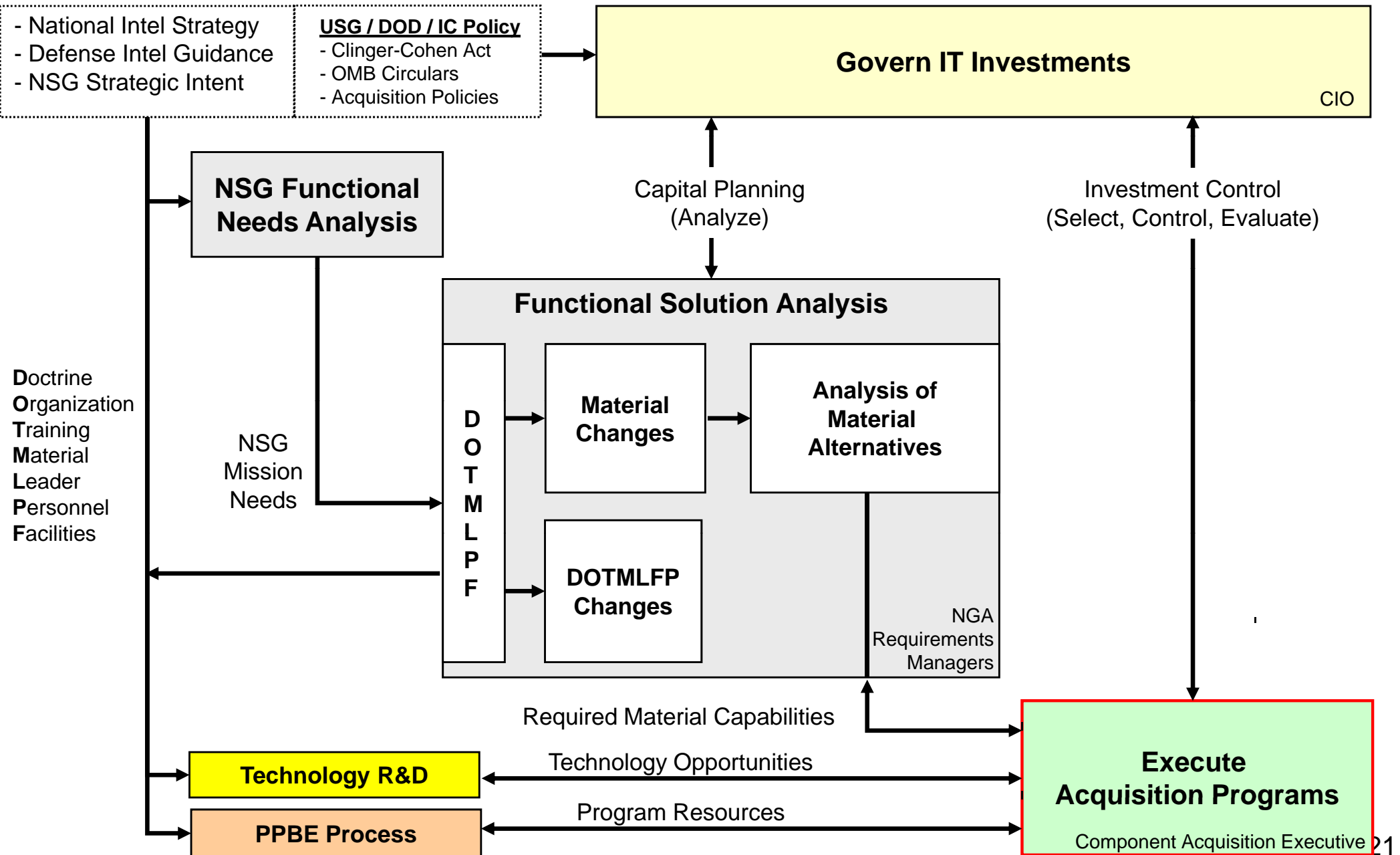


Relationships with Acquisition Processes





Relationships Among NGA Processes





Managing Culture Change

- ASP-ISP and NSET are major changes
- Changing the culture is HARD
- NSET SEs form a cohesive support network
- NSET SEs spread the word
- Leadership actively advocates the changes
 - Multi-faceted communication
 - Directing work into the NSET
 - Directing the use of NSET practices and forums



NSET Member Motivation

- Unambiguous senior leadership support
- Knowledge that Enterprise SE is the best approach
- Personal lessons observed and learned
- Personal successes



NSET Piloting

- First step of a phased implementation
- Representative sample of actual initiatives
 - Rapid delivery of capability required
 - Application development only
 - Multi-year / multi-phased
 - Pre-concept & Concept Phase studies



NSET Piloting Results

- Contributed to better defining roles and responsibilities
 - Charter
 - Concept of Operations
 - New and revised forums and agendas
- Numerous lessons observed and learned
- Broadened opportunities and practices



Formal Stand-up

- Slow, low-key, phased
 - Team organization
 - Getting office space
- ... but operations have begun
 - Numerous studies reviewed and approved
 - Increased involvement in enterprise activities
 - Critical momentum building
 - Continuous improvements

“...this is something the NSET
should handle....” (the new mantra)



NSET Benefits

- Currently qualitative findings only
- Improved technical management of enterprise
- ASP & ISP functions and enterprise initiatives becoming better understood and executed
- Reducing delivery time and pain



NSET Benefits

- Infrastructure capabilities aligned with system needs
- Finding/eliminating duplicated implementation and support costs sooner
- Reduced mis-communications and disconnects
- Enterprise changes begin with joint analyses
 - Better insights to other providers' capabilities
 - Earlier approval of funding recommendations.



Conclusions

- ASP-ISP business model can improve efficiency of work allocation on Information Technology developments
- Systems Engineering is the common denominator to synchronize collaboration
- Increased responsiveness to the customer needs and quality of service will continue



Questions???



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